

## CLAIMS

1. Apparatus for purifying water to USP or WFI purification  
2 standards, comprising:

4 a heat exchanger adapted to receive chlorinated feed water to  
be purified, said heat exchanger heating the feed water to a predetermined  
temperature;

6 a filter connected to said heat exchanger for receiving feed  
water therefrom, said filter being a microfilter or an ultrafilter having a  
8 nominal pore size of about 0.1 microns or less to be capable of removing  
bacteria from the feed water;

10 a filtrate reservoir connected to said filter for receiving filtrate  
therefrom;

12 a dechlorinator connected to said reservoir to receive filtrate  
from the reservoir, said dechlorinator removing chlorine from the filtrate;

14 a backwash line connected to said reservoir to receive filtrate  
from the reservoir and direct the filtrate in reverse flow through the filter to  
16 backwash the filter; and

18 a still connected to said dechlorinator to receive dechlorinated  
filtrate therefrom and distill the same to provide USP or WFI quality purified  
water, said still being a vapor compression still or a multiple effect still.

2        2. The apparatus of claim 1 further including a reverse osmo-  
sis membrane unit interposed between said still and said dechlorinator.

2        3. The apparatus of claim 1 further including a filtrate treating  
anti-scalant device upstream of said still for treating filtrate so as to elimi-  
nate or minimize scaling within said still.

2        4. The apparatus of claim 3 wherein said filtrate treating anti-  
scalant device is a water softening device located upstream of said  
dechlorinator and downstream of said reservoir.

2        5. The apparatus of claim 3 wherein said filtrate treating anti-  
scalant device is a chemical injector for injecting anti-scaling chemicals into  
said filtrate downstream of said dechlorinator.

6. Apparatus for purifying water to USP or WFI purification  
2 standards, consisting essentially of:

4 a chlorine tolerant ultra filtration or micro filtration filter unit  
having the capability of removing bacteria from a chlorinated feed water  
stream;

6 a dechlorination unit connected to said filter unit for receiving  
filtrate therefrom;

8 a vapor compression or multiple effect still connected to said  
dechlorination unit for distilling the filtrate to produce purified water at USP  
10 or WFI purification standards; and

12 a water softening system located connected between said  
filter unit and said dechlorination unit to remove scale causing constituents  
from said filtrate.

7. The apparatus of claim 6 wherein said filter is a microfiltration  
2 filter having a nominal pore size of about 0.1 microns or less.

8. The apparatus of claim 7 wherein said filter is a polyvinylidene filter.  
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9. The apparatus of claim 6 wherein said filter is an ultra  
filtration filter having a nominal pore size of about 80,000 Dalton MWCO  
2 or less.

10. The apparatus of claim 9 wherein said filter is a  
2 polyacrylonitrile filter.

11. Apparatus for purifying water to USP or WFI purification  
4 standards, consisting essentially of:

6               a chlorine tolerant ultra filtration or micro filtration filter unit  
having the capability of removing bacteria from a chlorinated feed water  
stream;

8               a dechlorination unit connected to said filter unit for receiving  
filtrate therefrom;

10              a vapor compression or multiple effect still connected to said  
dechlorination unit for distilling the filtrate to produce purified water at USP  
12 or WFI purification standards;

14              a reverse osmosis unit connected between said dechlorination  
unit and said still; and

16              an anti-scale chemical injection unit connected between said  
dechlorination unit and said reverse osmosis unit.

12. The apparatus of claim 11 wherein said filter is a  
2 microfiltration filter having a nominal pore size of about 0.1 microns or less.

13. The apparatus of claim 12 wherein said filter is a  
2 polyvinylidene filter.

14. The apparatus of claim 11 wherein said filter is an ultra  
2 filtration filter having a nominal pore size of about 80,000 Dalton MWCO  
or less.

15. The apparatus of claim 14 wherein said filter is a  
2 polyacrylonitrile filter.

16. A method of producing USP purified water or water for  
2 injection comprising:

- 4 (a) providing a chlorinated feed water;
- (b) filtering the feed water in a chlorine tolerant microfilter  
6 or ultrafilter having a nominal pore size of 0.1 microns  
or less;
- (c) antiscale treating the filtrate from the filter; and
- 8 (d) distilling the antiscale treated filtrate.